

WHAT IS CLAIMED IS:

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1. A field-effect semiconductor device comprising:
a channel layer;
a contact layer;
a semiconductor structure having an electron-affinity different from those of the channel layer and the contact layer and formed between the channel layer and the contact layer, the semiconductor structure having a first junction face between the semiconductor structure and the channel layer and having a second junction face between the semiconductor structure and the contact layer;
an ohmic electrode formed on the contact layer; and
a Schottky electrode formed on the semiconductor structure;
wherein the first junction face between the channel layer and the semiconductor structure and the second junction face between the contact layer and the semiconductor structure are iso-type heterojunctions.

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2. A field-effect semiconductor device according to claim 1, wherein the channel layer and the semiconductor structure at the first junction face are each formed of n-type doped layers, and the contact layer and the semiconductor structure at the second junction face are each formed of n-type doped layers.

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3. A field-effect semiconductor device according to claim 3, wherein the channel layer and the semiconductor structure at the first junction face each have a dopant concentration of $1 \times 10^{18} \text{ cm}^{-3}$, and the contact layer and the semiconductor structure at the second junction face each have a dopant concentration of $1 \times 10^{18} \text{ cm}^{-3}$.

4. A field-effect semiconductor device according to claims 1 or 2, wherein the semiconductor structure is composed of a single material and has an electron-affinity smaller than those of the channel layer and the contact layer.

5. A field-effect semiconductor device according to claim 3, wherein the semiconductor structure is composed of a single material and has an electron-affinity smaller than those of the channel layer and the contact layer.

6. A field-effect semiconductor device according to claim 4, wherein the semiconductor structure is composed of AlGaAs.

7. A field-effect semiconductor device according to claim 5, wherein the semiconductor structure is composed of AlGaAs.

8. A field-effect semiconductor device according to claims 1, 2 or 3, wherein the channel layer is composed of InGaAs.

9. A field-effect semiconductor device according to claim 8, wherein the semiconductor structure is composed of a single material and has an electron-affinity smaller than those of the channel layer and the contact layer.

10. A field-effect semiconductor device according to claim 8, wherein the semiconductor structure is composed of AlGaAs.

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